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Potential of Terminalia Arjuna as A Source of Diverse Drugs

KEYWORDS: Terminalia arjuna, Tannins, Water soluble extractives, Alcohol soluble extractives.

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ABSTRACT *The present study on Terminalia arjuna focuses the viability of exploitation of the plant on commercial basis. The available knowledge has been substantiated by certain experiments in the current study and a comparison has been made. The plant parts viz, the flowers, fruits, and bark of Terminalia arjuna are capable of giving drugs. Tannins were found to be the chief chemical constituents present in the bark. Ellagic acid is a staple tannin. The total tannin content in the bark was found to be 55%. The parameters such as bulk density, tapped density, acid insoluble ash, WSE, ASE, Loss on drying were estimated for the bark. The plant has great feasibility for exploitation on commercial scale as it contained 63.8% water soluble extractives and 44.2% alcohol soluble extractives.*

INTRODUCTION

The prime uses of plants can be classified as economic, medicinal, ecological and aesthetic. It is believed that most of the species have disappeared even before their potential as a resource was fully realized. The present study is an attempt to bring together the available knowledge on Terminalia arjuna (Roxb.) which is widely used since ages. Medicinal and aromatic plants constitute a large segment of the flora, which provides raw materials for use by the pharmaceuticals, cosmetic, fragrance and flavour industries. It has been estimated that India is endowed with about 47,000 species of plants, out of these 8,000 species are known to be medicinal. Globally, the demand for medicinal plants and plant derivatives is growing at a rate of 7-15% per annum. Similarly, around 2500 plant species are known to contain aromas. World production of essential oils is estimated at about 1, 20,000 tonnes and India ranks third with a share of about 16%.

Terminalia arjuna

Terminalia arjuna assumes importance with its characteristic of cosmopolitan distribution. This has been a widely attempted plant for extractions from all parts of the plant. Terminalia arjuna belongs to the family, Combretaceae. It is a large deciduous tree commonly known as Arjuna (Sans), Arjun (Hindi) and Arjuna Myrobalan (Eng). The plant grows to a height of 60-90 ft. The leaves are sub opposite, ovate, coriacious, flowers are sessile, yellowish, short auxiliary spikes, bracteoles minute. Fruit is Samara with 5-7 equal wings. Bark is thick, white to pinkish grey in colour. The fruiting season is generally from April to December, (Pulliah and Chennaiah, 1997).

MATERIAL AND METHODS

The present study has been planned to extract number of products from the bark of T. arjuna. The quantitative as well as qualitative assay was carried out using HPTLC technique. The shade-dried bark was subjected to phyto-chemical evaluation. The standardized coarse powder of the bark was subjected to successive solvent extraction using Soxhlet apparatus. The water extraction was performed for the bark of Terminalia arjuna using water and Methanol (5:1) in hot condition by using vacuum to prevent the decomposition of the material. The total extract was concentrated to evaporate the solvent present in it and thereby reducing its volume. Then the concentrate was filtered and vacuum dried. The dried product was then pulverized. 1000g of the bark gave 250 g of powder material.

Herb to Product Ratio: (HPR) = 1000/250 = 4:1

The bark was analyzed for its potential yield of medicinal products. Various physico-chemical parameters such as, Loss on drying, water soluble extractives, alcohol soluble extractives, pH, acid insoluble ash, bulk density as well as tapped density, total ash content and tannins have been estimated and the values were expressed in percentages except where specifically stated.

RESULTS AND DISCUSSION

The bark and ashes of T. arjuna are commonly used in dying and tanning. The gum, bark, leaves and fruits are medicinally important. T. arjuna bark, is widely used in ayurvedic and other traditional medicines in curing fractures, ulcers, blood diseases, intoxication, urinary discharge, cough, diseases of heart, anemia, asthma and tumours. Rahman et al (2004) reported that T. arjuna was used as medicine in Ayurvedic system as it contains a wide range of chemical constituents such as tannins, triterpenoids, glycosides, cardinolides, sapogenins, Flavonoids, phenolics, phytosterols and salts of Ca, Mg, Zn.

Tannins are the chief chemical constituents present in T. arjuna bark and are known to possess anti-inflammatory and immuno-modulatory properties and ellagic acid (Tannin) is a strong antioxidant. T. arjuna bark contains ellagic acid as one of the main phyto-constituents. Several scientific studies reveal interesting facts about the usefulness of this plant at various stages of the disease related to all the organs of human body. The studies of Harak et al (2005) revealed that normotens consisting of phytoingredients, such as Centella asiatica and T. arjuna, exerted anti-hypertensive activity by influencing sympatho-adrenal axis and cardiac output. Two new pentacyclic triterpenoid glycosides were isolated from the bark, namely Olean–3–alpha, 22–beta–diol–12en–28– oic acid–3–0–beta–D–glucopyranosyl (1 to 4)–beta-D–glucopyranoside and Olean–3–beta–6–beta,22–alpha–triol–12–en–28–oicacid–3–0–beta–D– glucopyronesyl (1 to 4)–beta–D–gluco pyranoside 2, on the basis of spectral data analysis and chemical studies (Ali et al 2004). The Casuarinins, induce oxidative stress, decrease DNA oxidative damage and prevents the depletion of intracellular GSH in Madin–Darby Carine Kidney (MDCK) cells. (Chen et al 2005). Casuarinin, a hydrolysable tannin from the bark induces apoptosis and cell cycle arrest in human breast adeno-carcinoma MCF – 7 cells by Kuo et al

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(2005). The bark was analysed the loss on drying (LOD) value gives the amount of material, which is lost on drying. The loss on drying was 2.75% where as the bark of arjuna contained 63.83% of Water Soluble Extractives (Table 1).

Table 1: Characteristics of the bark of T. arjuna extracted in the aqueous medium

S.No	Parameter	Value (%)
1	PH	5.63
2	Loss on drying (LOD)	2.754
3	Bulk Density	0.735 g/ml
4	Tapped Density	1.102 g/ml
5	Water soluble extractives (WSE)	63.835
6	Alcohol soluble extractives (ASE) % of ASE d/b	44.174
7	Acid insoluble ash	8.815
8	Total Ash	9.904
9	Tannins	54.465

The pH was slightly acidic. It was recorded as 5.63. The percentage of total ash i.e. the carbonaceous matter which can be turned to ash at high temperature was estimated. The samples have shown a total ash content of 9.9%. The burnt ash was soluble in some acids up to certain limit. The acid insoluble ash was 8.8% when HCl was administered for the purpose. The samples contained 44.2% of alcoholic soluble extracts. The compaction is more when the bulk density is more. In the present study, the BD and tapped density were calculated at 500 and 750 taps. The values of BD and TD were 0.73 gm/ml and 1.1 g/ml, respectively. The bark of T.arjuna possessed 54.4%Tannis.Tannins extracted from the bark of T. arjuna have been reported earlier by several scientists. It was also reported earlier that, out of these tannins, casuarinin, catechol, arjunin etc. are having medical importance by Rahman et al., (2004), Zhang et al., (2004), Chen et al., (2005) and Kuo et al., (2005).

CONCLUSION:

India has the history of more than two millennia in the utilization of plant derivatives as therapeutics. Most of the useful compounds from such plant extracts are still not documented from most of the plants. The present study is an attempt to fill the gap and add knowledge on the most popular plant Terminalia arjuna, popularly called as 'tella maddi' in Telugu. The present study revealed that the plant contained most important tannins to the tune of 54.4%, which makes the commercial exploitation of tannins viable. Terminalia arjuna has absolute commercial viability as it contained 63.8% water soluble extractives and 44.2% alcohol soluble extractives. Hence its potential as drug provider is no doubt immense. Further studies on the availability of the different compounds of medicinal value from this tree from different environments showing ecotypic differences need to be carried out and documented in order to fully exploit the vast potential of this plant.

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